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Notes:

1. Untranslatable words are replaced with asterisks (***).
2. Texts in the figures are not translated and shown as it is.

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FULL CONTENTS

[Claim(s)]

[Claim 1]A consumable electrode type DC arc welder comprising:

The welding voltage detector circuit unit which detects welding voltage and outputs a welding voltage detection signal.

A short circuit arc decision circuit section which inputs said welding voltage detection signal, judges a short circuit or an arc, and outputs a short circuit arc decision signal.

a time check which outputs a constant-current-control start signal after inputting said short circuit arc decision signal, canceling a short circuit and predetermined time's passing -- a part.

A constant-current-control period setting part which inputs said constant-current-control start signal, and outputs a signal during the constant current control, The welding current detector circuit unit which detects welding current and outputs a welding current detection signal, A short circuit waveform controlling circuit part which inputs said welding current detection signal and outputs a short circuit waveform signal based on it, The constant current control circuit unit which inputs a welding current detection signal, sets up predetermined constant current based on it, and outputs a constant current signal, An arc waveform controlling circuit part which inputs said welding voltage detection signal and outputs an arc waveform signal of an arc period based on it, The 1st switching circuit part that an arc period chooses said arc waveform signal, and chooses said short circuit waveform signal during the short circuit with said short circuit arc decision signal, and is outputted, The 2nd switching circuit part that chooses said constant current signal during the constant current control with a signal during [said] the constant current control, chooses an output signal from said 1st switching circuit part except a constant-current-control period, and is outputted.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the consumable electrode type DC arc welder which welds by generating a DC arc between a welding wire (only henceforth a wire), and a welding base material (only henceforth a base material).

[0002]

[Description of the Prior Art]In the direct-current-arc-welding machine of the conventional example which welds by generating a DC arc between a wire and a base material, by an arc period, voltage control is performed, in a short circuit period, it is common to perform current control (refer to the volume for 2 pieces of welding connection manual Japan Welding Society), and the example of composition is shown in drawing 4.

[0003]In a three-phase-alternating-current input and 13, in drawing 4, 12, a transformer and 15, a torch and 18 show a wire, 19 shows a base material, and, as for a diode rectification circuit and 14, 20 shows [as for a diode auto rectification circuit and 16] CT, as for a reactor and 17. And the welding voltage detector circuit unit 1 which this direct-current-arc-welding machine detects welding voltage, and outputs a welding voltage detection signal, The short circuit arc decision circuit section 2 which inputs a welding voltage detection signal, judges a short circuit or an arc, and outputs a short circuit arc decision signal, The welding current detector circuit unit 8 which detects welding current and outputs a welding current detection signal, The short circuit waveform controlling circuit part 6 which inputs a welding current detection signal and outputs a short circuit waveform signal based on it, The arc waveform controlling circuit part 7 which inputs a welding voltage detection signal and outputs the arc waveform signal of an arc period based on it, It has the 1st switching circuit part 25 that an arc period chooses an arc waveform signal, chooses a short circuit waveform signal during the short circuit with a short circuit arc decision signal, and is outputted, When the short circuit waveform signal which is an output of the short circuit waveform controlling circuit part 6 was transmitted to the power element 5, the short circuit was canceled and an arc period came during the short circuit, it had become the composition of transmitting the arc waveform signal which is an output of the arc waveform controlling circuit part 7 to the power element 5.

[0004]

[Problem to be solved by the invention]Although the tip of the wire 18 approaches the base material 19, it shifts to the short circuit 21 from (b) as shown in (c) as shown in (a), and the short circuit 21 is canceled in the rebounding shift at the time of the globular transfer seen when welding with the current of 200A-300A (refer to the mimetic diagram of the droplet transfer of drawing 3), the residual wire fusion zone 18a elongated horizontally without the ability to shift to the base material 19 at this time -- (d) -- it generates in a wire top end like. If

this residual wire fusion zone 18a becomes the short circuit 24, as shown in (e), a part of residual wire fusion zone 18a will serve as the weld slag 18b, and it will disperse. If wire pushing-out length changes with change of work shapes, change of a welding position, etc., as shown in the welding current waveform of drawing 3, the short circuit 24 may occur immediately after release of the short circuit 21, since it is immediately after release of the short circuit 21, the current value at the time of generating of the short circuit 24 will be high, and generating of the weld slag 18b will increase. 22 is an arc period. a-e corresponds to (a) - (e).

[0005]If generating of the weld slag 18b increases, these will adhere to the base material 19 and will reduce welding quality. Since the member will be discarded when repair of weld is needed and repair is impossible if it results in generating frequency where generating of the weld slag 18b is not permitted, a fall and remarkable non-economy of efficiency of work are brought about. Therefore, while controlling that a wire fusion zone which remains in a wire top end part without solving the above-mentioned problem and being able to shift to a base material elongates the purpose of this invention horizontally, It is providing a consumable electrode type DC arc welder which controls generating of weld slag by controlling a short circuit generated immediately after short circuit release.

[0006]

[Means for solving problem]The welding voltage detector circuit unit which a consumable electrode type DC arc welder of Claim 1 detects welding voltage, and outputs a welding voltage detection signal, A short circuit arc decision circuit section which inputs a welding voltage detection signal, judges a short circuit or an arc, and outputs a short circuit arc decision signal, a time check which outputs a constant-current-control start signal after inputting a short circuit arc decision signal, canceling a short circuit and predetermined time's passing, [part] A constant-current-control period setting part which inputs a constant-current-control start signal and outputs a signal during the constant current control, The welding current detector circuit unit which detects welding current and outputs a welding current detection signal, A short circuit waveform controlling circuit part which inputs a welding current detection signal and outputs a short circuit waveform signal based on it, The constant current control circuit unit which inputs a welding current detection signal, sets up predetermined constant current based on it, and outputs a constant current signal, An arc waveform controlling circuit part which inputs a welding voltage detection signal and outputs an arc waveform signal of an arc period based on it, and the 1st switching circuit part that an arc period chooses an arc waveform signal, and chooses a short circuit waveform signal during the short circuit with a short circuit arc decision signal, and is outputted, A constant current signal is chosen during the constant current control with a signal during the constant current control, and it has the 2nd switching circuit part that chooses and outputs an output signal from

the 1st switching circuit part except a constant-current-control period.

[0007]If constant current control is carried out during the predetermined period with a current value higher than the current value outputted by the constant voltage control from the former after predetermined time progress from the time of a short circuit being canceled according to the consumable electrode type DC arc welder of Claim 1, The wire fusion zone which is seen by the rebounding shift at the time of globular transfer, which remains in a wire top end part without the ability to shift to a base material and which was elongated horizontally is made an arc and a counter direction using the reaction force of an arc, and it controls that a wire fusion zone develops horizontally. Generating of the short circuit immediately after short circuit release generated when the wire top end after short circuit release and the distance between base materials, i.e., arc length, are secured and the time of rebounding shift of globular transfer and wire pushing-out length change can be controlled, and generating of weld slag can be controlled.

[0008]By these, decline in working capacity, such as improvement in welding quality, control of a fall of bead appearance, and repair of weld, is canceled, and good welding workability can be maintained.

[0009]

[Mode for carrying out the invention]Drawing 1 and drawing 2 explain the 1 embodiment of this invention. 1 is the welding voltage detector circuit unit -- this welding voltage detection signal -- the short circuit arc decision circuit section 2 -- simplistic -- or -- the 1st switching circuit part 11 that judges an arc and has a switching element for a short circuit arc decision signal, and a time check -- it tells the part 10. a time check -- in the part 10, a short circuit is canceled, and after predetermined time's passing, a constant-current-control start signal is outputted to the constant-current-control period setting part 4. In the constant-current-control period setting part 4, a constant-current-control start signal is inputted and a signal is outputted to the 2nd switching circuit part 3 during the constant current control. In the welding current detector circuit unit 8, welding current is detected and a welding current detection signal is outputted to the short circuit waveform controlling circuit part 6 and the constant current control circuit unit 9. In the short circuit waveform controlling circuit part 6, an arc waveform signal is outputted for a short circuit waveform signal to the 1st switching circuit part 11 based on a welding voltage detection signal based on a welding current detection signal at the arc waveform controlling circuit part 7 again. In the constant current control circuit unit 9, a constant current signal is outputted to the 2nd switching circuit part 3 that has a switching element based on a welding current detection signal. In the 1st switching circuit part 11, with a short circuit arc decision signal, a short circuit waveform signal is chosen at the time of a short circuit, an arc waveform signal is chosen at the time of an arc, and it outputs to the 2nd switching circuit part 3. In the 2nd switching circuit part 3, during the constant current control, in a constant-current-control

period, a constant current signal is chosen, in other than a constant-current-control period, the output from the 1st switching circuit part 11 is chosen, and they output it to the power element 5 with a signal. In addition, identical codes are given to the portion which is common in drawing 4, and explanation is omitted.

[0010]The output wave of this invention is shown in drawing 2. This drawing 2 shows formation of a welding current waveform and a droplet, the process of shift, and the relation of the welding current waveform. In the inside of 21, a short circuit waveform is outputted during the short circuit, and if a short circuit is canceled, 23 will be controlled by predetermined constant current higher than the current value outputted by the constant voltage control from the former during the predetermined period after predetermined time progress. 22 is an arc period.

[0011]Although it shifts to (c) from (b) and the short circuit 21 is canceled in the wire top end part of the short circuit 21 in the rebounding shift at the time of the globular transfer seen by this when welding with the current of 200A-300A (refer to the mimetic diagram of the droplet transfer of drawing 2), The residual wire fusion zone 18a horizontally elongated [shift partition ****] to the base material 19 occurs in a wire top end (d).

[0012]If constant current control is performed in 23 during the predetermined period in this state, it will control that make the wire fusion zone 18a an arc and a counter direction, and (e) and the residual wire fusion zone 18a develop horizontally according to the reaction force of an arc (f). Since constant current control is carried out immediately after release of a short circuit, it is secured, the distance, i.e., the arc length, between a wire top end and a base material, and the short circuit generated immediately after release of a short circuit is controlled. a-f corresponds to (a) - (f).

[0013]

[Effect of the Invention]period constant current control predetermined with the current value higher than the current value outputted by the constant voltage control from the former after predetermined time progress from the time of a short circuit being canceled according to the consumable electrode type DC arc welder of Claim 1, if it carries out, The wire fusion zone which is seen by the rebounding shift at the time of globular transfer, which remains in a wire top end part without the ability to shift to a base material and which was elongated horizontally is made an arc and a counter direction using the reaction force of an arc, and it controls that a wire fusion zone develops horizontally. Generating of the short circuit immediately after short circuit release generated when the wire top end after short circuit release and the distance between base materials, i.e., arc length, are secured and the time of rebounding shift of globular transfer and wire pushing-out length change can be controlled, and generating of weld slag can be controlled.

[0014]By these, decline in working capacity, such as improvement in welding quality, control of a fall of bead appearance, and repair of weld, is canceled, and good welding workability can be

maintained.

[Brief Description of the Drawings]

[Drawing 1] It is a block diagram about the composition of the consumable electrode type DC arc welder of the 1 embodiment of this invention.

[Drawing 2] It is an explanatory view showing the relation of the process of shift of a welding current waveform and a wire top end.

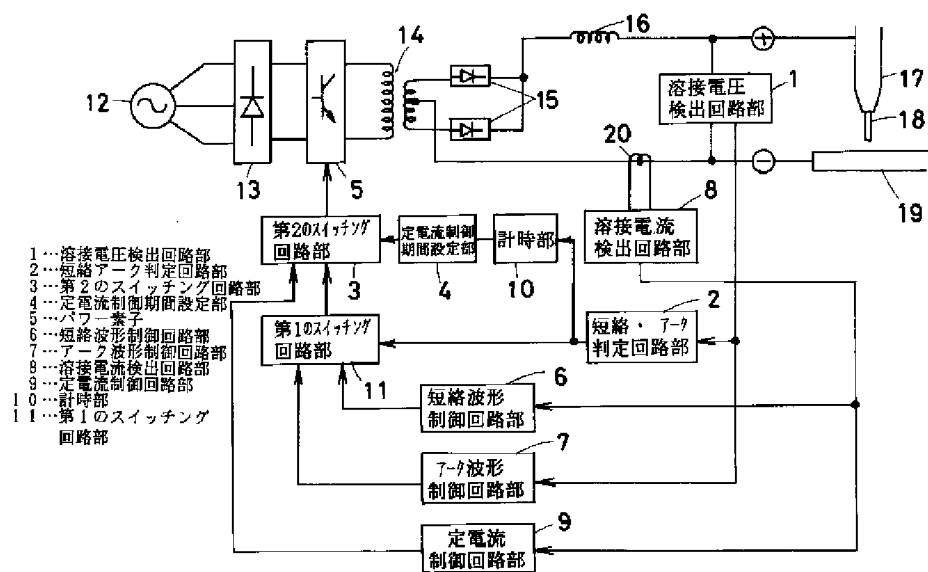
[Drawing 3] It is an explanatory view showing the relation between the welding current waveform of a conventional example, and the process of shift of a wire top end.

[Drawing 4] It is a block diagram showing the composition of the consumable electrode type DC arc welder of a conventional example.

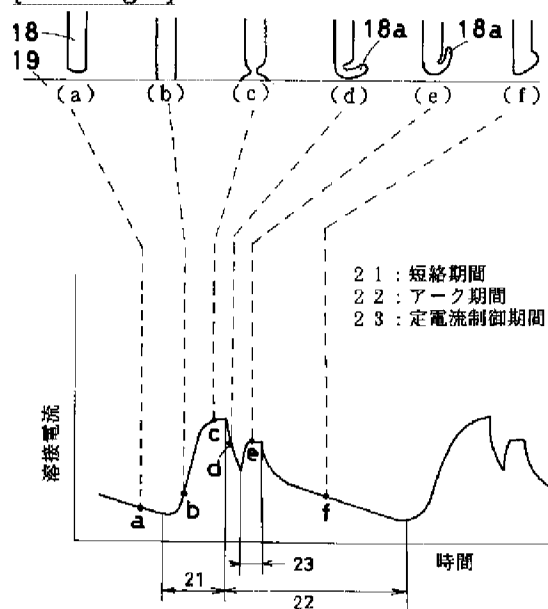
[Explanations of letters or numerals]

- 1 Welding voltage detector circuit unit
 - 2 Short circuit arc decision circuit section
 - 3 2nd switching circuit part
 - 4 Constant-current-control period setting part
 - 5 Power element
 - 6 Short circuit waveform controlling circuit part
 - 7 Arc waveform controlling circuit part
 - 8 Welding current detector circuit unit
 - 9 Constant current control circuit unit
 - 10 time check -- part
 - 11 1st switching circuit part
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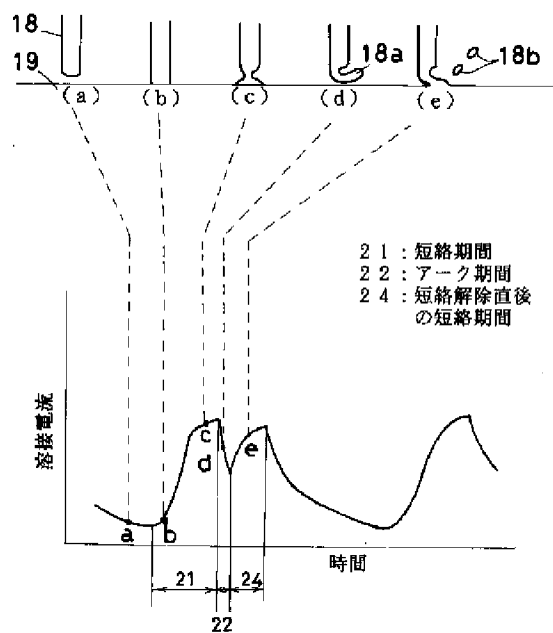
[Drawing 1]



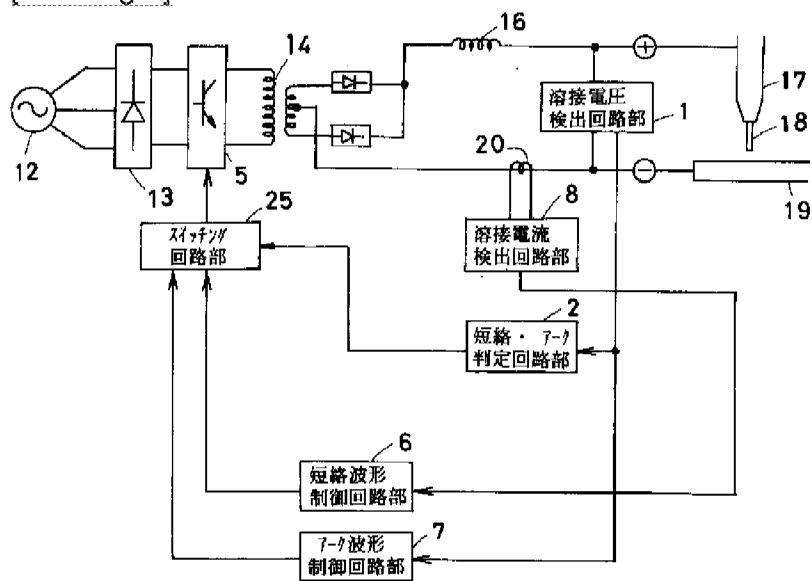
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]